Section 2D

Monitoring Plan for AWPAR HADD Crossings
v1 June 2007

Technical Memorandum

Date: 29 June 2007

To: **Paul Savoie, Fisheries and Oceans Canada, Iqaluit, NU**

Cc: **Louise Grondin and Stephane Robert (Meadowbank Mining Inc./Agnico-Eagle Mines Ltd.)**

From: **Gary Mann**

RE: **Monitoring Plan for Meadowbank Project All-Weather Private Access Road (AWPAR) HADD Crossings for Condition 5 of Authorization NU-03-0190 (2)**

Introduction

The Meadowbank Project AWPAR will connect the Hamlet of Baker Lake to the mine site. Fisheries and Oceans Canada (DFO) issued a subsection 35(2) *Fisheries Act* Authorization (NU-03-0190 [2]) for the harmful alteration, disruption or destruction (HADD) of fish habitat due the planned encroachment of bridge abutments into the stream channel at five crossings (R02, R06, R09, R15 and R19). This submission meets the requirements of Condition 5.1 of the Authorization, which stipulates the development of a monitoring plan by 29 June 2007.

Construction Schedule

While the project was initially planned for completion prior to spring thaw (i.e., all crossing construction was to have been completed under frozen conditions when no fish were present), construction will now be occurring throughout the summer periods, as per the revised schedule upon which the new Authorization is based. Consequently, timing windows for the AWPAR need to be defined.

Timing Window

Condition 3.1 of the Authorization stipulates that "no in-water work shall occur during critical spawning and rearing periods for any fish species in the affected waterbodies." Based on the last two years worth of fisheries monitoring conducted at the HADD crossings, Arctic grayling represent the vast majority of fish using these watercourses. Consequently, the timing window for restricting in-water works should be based on the local life history of arctic grayling. Monitoring in previous years has targeted adult use of waterbodies for migration (i.e., using hoop nets) and within-stream reproduction (using larval drift traps). As all these waterbodies are frozen solid during the winter months, there is no potential for fish use until the open water season starts. Adult fish would move into streams once there is sufficient flow and lack of ice blockages to allow passage to spawning grounds. Incubation of arctic grayling eggs takes approximately 16 to 18 days at 9 C, with newly hatched alevin emerging from the substrate some 3 to 5 days later. Young of the rear would either remain in semi-deep pools in the stream or be passively transported to downstream lakes. Consequently, we recommend the timing window for fish-bearing streams in the project area to be between the onset of open water conditions through the end of July.

Monitoring Plan

Approvals – As per Condition 5.1, this detailed monitoring plan needs to be submitted for DFO review and approval prior to implementation. However, fish migration monitoring activities started in the third week of June in order to ensure consistency with baseline monitoring efforts. This timing was discussed with DFO previously; any substantive comments will be incorporated into this year's program (if possible) or into next year's.

Schedule – As per Condition 5.2, this monitoring plan is to be implemented annually for the years 2007 through 2010, then every other year from 2012 through one year post-decommissioning. Several required components of the monitoring plan can only be implemented after completion of the compensation works, for which Condition 4.1 stipulates that a detailed compensation plan is submitted by 15 August 2007. Furthermore, we suggest that the adaptive management philosophy underlying the conditions of the Authorization be followed to allow critical review of monitoring components and/or frequency after several years of data are available. For example, if successful fish passage is documented for stream crossings throughout the annual monitoring period (i.e., 2007-2010), then consideration should be given to using flow data, which is a good surrogate indicator of the potential for fish passage, at the crossing during the freshet period. All such aspects of the program would be reviewed to optimize monitoring while meeting the ultimate goals of DFO.

Stability and Utilization of Compensation Area[1] *(Condition 5.2.1)* – The compensation works are being designed with careful consideration of local hydrological conditions at crossing R02 and the requirements for successful reproduction of arctic grayling. Notwithstanding, monitoring the effectiveness of the works provides valuable information to ensure that the stated compensation goals are being met. Stability of the compensation works will be assessed each monitoring year after freshet conditions subside enough to allow safe access in-water access to the site. The works will be visually inspected at that time to determine whether any adverse changes (e.g., partial erosion of the feature or alteration of spawning substrate) have occurred that might affect its performance. The biological effectiveness of the compensation feature will be evaluated by continuing the larval drift trap surveys started during baseline work at R02. As the needs of the survey will have expanded to address compensation performance, a higher intensity of monitoring will be conducted (i.e., approximately the same effort as previous years, but focused at R02 only). We propose placing drift traps at various locations both upstream and downstream of the compensation area. This monitoring will begin in 2007 to allow at least a year of baseline data prior to constructing the compensation works. While larval drift data are inherently variable, the results should provide an indication as to the success of the planned compensation.

Continued Use of Waterbodies for Adult Fish Migration (5.2.2) – We propose to address this issue by modifying the adult fish migration surveys conducted during baseline monitoring, where we deployed hoop nets oriented in both upstream and downstream to quantify adult fish movement in both directions. The proposed modification would be to target upstream migration only since the major concern is the establishment of velocity barriers with the installation of the bridges. Thus, monitoring will target the HADD crossings only and will be timed to start as soon as ice breakup has progressed to the degree that damage from floating ice is minimal. Nets will be set up above and below the bridges; the downstream net will allow us to document the presence of fish in migration and the upstream net to confirm passage past the bridge. All fish will be tagged to allow future identification of individuals. Nets will be checked each day (unless impossible due to safety or logistical reasons); the upstream results can be compared to the baseline results to determine whether the crossing installations have adversely affected fish use. Given that fish population sizes are naturally variable and could change for a host of reasons, current velocities in the channel under the crossing structures will also be measured as a point of comparison to evaluate whether any observed reductions in migration rates could be due to the presence of hydrological barriers associated with the crossing structures. As discussed previously in "Schedule", the use of more efficient indirect observation methods (e.g., flow monitoring during freshet) should be considered if it is shown that the crossing do not adversely affect fish passage.

Adaptive Management of Compensation Works (Condition 5.2.3) – If the weight of evidence collected during monitoring program in successive years indicates that the compensation feature is not working as intended, then strategies for addressing the identified deficiency will be developed and discussed with DFO. Remedies could range from slight modifications to the existing compensation feature to the design and installation of additional compensatory habitat. The guiding principles of the No-Net-Loss Plan (Azimuth, 2006) will be used to assess which strategies are appropriate for the situation.

[1] The AWPAR No-Net-Loss Plan (Appendix A of Cumberland, 2006) recommended compensating for the five HADDs primarily at R02, with limited compensation at R06. As reflected in the Authorization, all compensation is now planned for R02 due to greater scope for successful habitat enhancement at that location.

Creel Surveys of Local Fishing (Condition 5.2.4) – Information collected during the environmental assessment process suggests that the affected waterbodies are not directly used for fishing. Notwithstanding, an annual creel survey program was initiated this past year with the local Hunter Trapper Organization in the hamlet of Baker Lake to assess the location and intensity of fishing. The instructions solicit information on the fishing patterns of local people (location, species, and timing) and include regional maps. A local field technician was hired to support the day-to-day operations of the program.

Reporting (Condition 6) – Monitoring reports will be submitted to DFO (Iqaluit) by 31 December of each reporting year for the lifetime of the HADD crossings and 90 days after completion of crossing structure decommissioning and restoration.